WHAT IS CLAIMED IS:

1. A method for determining a desired lighting configuration for a vision system comprising a controllable lighting system and an imaging system, the desired lighting configuration usable to obtain a desirable image of at least one feature of a workpiece, the method comprising:

obtaining a plurality of base images of the at least one feature, each base image corresponding to an actual lighting configuration and comprising an actual image;

determining a set of at least one image result for at least one actual lighting configuration;

determining a set of at least one image result for at least one synthetic lighting configuration, each set of at least one image result based on the corresponding synthetic lighting configuration and at least one base image; and

determining a desired lighting configuration based on the sets of image results.

2. The method of claim 1, wherein the step of determining the desired lighting configuration comprises selecting one of an actual and a synthetic lighting configuration based on the corresponding set of at least one image result.

3. The method of claim 2, wherein the selection is based on comparing the corresponding set of at least one image result to at least one other set of at least one image result.

4. The method of claim 3, wherein the at least one other set of at least one image result comprises an image result corresponding to an adequate image.

5. The method of claim 4, wherein the at least one other set of at least one image result corresponds to the image results of at least one other of the actual and synthetic lighting configurations.

6. The method of claim 5, wherein selecting one of an actual and a synthetic lighting configuration based on the corresponding set of at least one image result comprises selecting the one of an actual and a synthetic lighting configuration corresponding to the best set of at least one image result.

7. The method of claim 3, wherein the set of at least one image result comprises a plurality of image results, and comparing the corresponding set of image results to at least one other set of image results comprises:

evaluating each set of compared image results to determine an overall result for each set; and

comparing the overall results.

8. The method of claim 7, wherein evaluating each set of compared image results to determine an overall result comprises according a relative importance to different types of image results included in the plurality of image results in determining the overall result.

9. The method of claim 8, wherein the according a relative importance to different types of image results further comprises according a first combination of relative importance when a particular type of image result is determined to have good reliability and the according a second combination of relative importance when the particular type of image result is determined to have poor reliability.

10. The method of claim 8, wherein the according a relative importance to different types of image results further comprises applying a weighting factor to at least one type of image result.

11. The method of claim 10, wherein each weighting factor is determined based on a membership function.

12. The method of claim 11, wherein the evaluation includes using fuzzy logic to determine the overall result.

13. The method of claim 2, wherein when the synthetic lighting configuration is selected, the step of determining the desired lighting configuration further comprises:

determining at least one additional actual lighting configuration based on the selected synthetic lighting configuration;

obtaining at least one additional actual image corresponding to the at least one additional actual lighting configuration;

determining a set of at least one image result for each at least one additional actual lighting configuration;

identifying the best set of image results, considering at least each set of image results corresponding to an additional actual lighting configuration; and

determining the desired lighting configuration to be the lighting configuration corresponding to the best set of image results.

14. The method of claim 13, wherein the controllable lighting system further comprises a programmable ring light having at least one controllable source

and a controllable height, wherein the at least one additional actual lighting configuration further comprises additional actual lighting configurations wherein the programmable ring light height is set to at least two settings over a refined range spanning the height setting in the selected synthetic lighting configuration, and the intensity setting of each programmable ring light source included in the synthetic lighting configuration is set to at least two levels for each height setting.

15. The method of claim 1, wherein the at least one image result comprises at least one of an edge position, an edge position score, an edge position rank, an edge shape, an edge shape score, an edge shape rank, an edge quality, an edge quality score, an edge quality rank, an edge strength, an edge strength score, an edge strength rank, a surface position, a surface position score, a surface position rank, a surface brightness, a surface standard deviation, a surface standard deviation score, and a surface standard deviation rank.

16. The method of claim 1, wherein the vision system further comprises at least one image analysis tool, wherein at least one image result is determined based on the operation of the image analysis tool.

17. The method of claim 1, wherein at least one of an actual lighting configuration and a synthetic lighting configuration is intended to correspond to full illumination.

18. The method of claim 17, wherein each actual and synthetic lighting configuration is intended to correspond to full illumination, and wherein basing a set of at least one image result on the corresponding synthetic lighting configuration and at least one base image at least comprises:

selecting at least two base images, the at least two base images together including illumination from all the light sources included in the synthetic lighting configuration;

dividing the pixel intensities of each base image by the number of selected base images;

summing the divided pixel intensities for corresponding pixels in the selected base images; and

basing the set of at least one image result on the summed pixel intensities.

19. A recording medium that stores a control program, the control program executable on a computing device, the computing device couplable to a vision system,

the control program including instructions for determining a desired lighting configuration for a vision system having a controllable lighting system, the desired lighting configuration usable to obtain a desirable image of at least one feature of a workpiece, the instructions comprising:

instructions for obtaining a plurality of base images of the at least one feature, each base image corresponding to an actual lighting configuration and comprising an actual image;

instructions for determining a set of at least one image result for at least one actual lighting configuration;

instructions for determining a set of at least one image result for at least one synthetic lighting configuration, each set of at least one image result based on the corresponding synthetic lighting configuration and at least one base image; and

instructions for determining a desired lighting configuration based on the sets of image results.

20. A carrier wave encoded to transmit a control program to a device for executing the control program, the device couplable to a vision system, the control program including instructions for determining a desired lighting configuration for a vision system having a controllable lighting system, the desired lighting configuration usable to obtain a desirable image of at least one feature of a workpiece, the instructions comprising:

instructions for obtaining a plurality of base images of the at least one feature, each base image corresponding to an actual lighting configuration and comprising an actual image;

instructions for determining a set of at least one image result for at least one actual lighting configuration;

instructions for determining a set of at least one image result for at least one synthetic lighting configuration, each set of at least one image result based on the corresponding synthetic lighting configuration and at least one base image; and

instructions for determining a desired lighting configuration based on the sets of image results.

21. A vision system comprising:

a controllable lighting system;

an imaging system; and

a light intensity control system, wherein:

the light intensity control system is operable to determine a desired lighting configuration usable to obtain a desirable image of at least one feature of a workpiece, the desired lighting configuration determined based on at least one set of actual image results corresponding an actual lighting configuration and at least one set of simulated image results corresponding to a synthetic lighting configuration, the desired lighting configuration being one of the actual and simulated lighting configurations that corresponds to a set of image results chosen by comparison to at least one other set of image results.

22. The vision system of claim 21, wherein the at least one other set of image result comprises at least one of an adequate set of image results and a set of image results corresponding to one of the other actual and synthetic lighting configurations.

23. The vision system of claim 21, wherein the chosen image result is the best available image result.

24. The vision system of claim 21, wherein the at least one simulated image result is based on the corresponding synthetic lighting configuration and at least two actual images, the at least two actual images together including illumination from all the light sources included in the synthetic lighting configuration.

25. The vision system of claim 24, wherein at least one actual and synthetic lighting configuration is intended to correspond to full illumination.

26. The vision system of claim 21, wherein each compared set of image results is evaluated to determine an overall image result for the set, and the comparison is based on the overall result.

27. The vision system of claim 21, wherein the vision system operates at least partially automatically to determine the desired lighting configuration.

28. The vision system of claim 21, wherein:

the light intensity control system is part of a general computerized control system of the vision system, the general computerized control system further comprising a control instruction generation system;

the light intensity control system is operable by the control instruction generation system; and

the control instruction generation system generates at least one of a part program, an inspection program control instruction, and a controllable lighting system

control instruction based on the desired lighting configuration determined by the light intensity control system.

29. The vision system of claim 28, wherein:

the control instruction generation system includes at least one image analysis tool, and at least one image result is determined based on the operation of the image analysis tool.

30. The vision system of claim 21, wherein the controllable lighting system comprises at least two of a stage light, a coaxial light, a ring light and a programmable ring light.